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data thus obtained will show the cost of treatment or maintenance of any ditch or other breeding place. Oil drip cans should be numbered and record kept of dates of filling and amounts supplied. The entries, or system of recording, should be made as simple as possible. It is very discouraging to a man anxious to get at the field work and not fitted for clerical work to be held back by such causes. The object of the records are:

(1) For the health officer or other person to whom the inspector reports to know what is going on and to be able to make intelligent inspections.

(2) In case there is a change of inspectors, if costs of work are increased or decreased the fact may be at once noted.

(3) No known breeding places can be accidentally neglected.

(4) The high unit-cost of oiling any one pond, ditch or stream will indicate the advisability of using other methods of control.

An excellent example of the results which may be obtained in our Southern States by the intelligent application of oiling as an antimalaria measure is the work accomplished under the direction of Dr. T. W. M. Long during the *Anopheles* propagation season of 1914, at Roanoke Rapids, N. C.

The settlement is a mill town. In 1913 malaria was rife and people were leaving town on that account. The mills could not get sufficient labor. Senior Surg. H. R. Carter and Surg. R. H. von Ezdorf, United States Public Health Service, inspected the existing conditions in 1913 and made appropriate recommendations. The mill owners wisely subscribed \$3,600 to carry out the proposed measures. The  $6\frac{1}{2}$  miles of streams and ditches were controlled by oil during 1914. Three thousand gallons of oil were used from May 20 to November 1, 1914, costing about \$300. The oil was used to supplement the drainage. Very few cases of malaria existed at Roanoke Rapids in 1914 and the change is so satisfactory to the mill owners that they propose to continue the oiling as a means of malaria control in the future.

The writer desires to acknowledge the suggestions and assistance received from Surg. R. H. von Ezdorf during the preparation of this paper.

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## HYPOCHLORITE TREATMENT OF WATER SUPPLIES.

### PORTABLE PLANT AND FIELD EQUIPMENT FOR ITS ADMINISTRATION

By H. A. WHITTAKER, Assistant Director, Division of Sanitation, Minnesota State Board of Health.

In 1910 the Minnesota State Board of Health constructed portable emergency hypochlorite plants (*a*) to be kept in readiness for immediate transportation to localities within the State where water supplies were suspected or known to be contaminated. These plants

have rendered great service, as their constant readiness and portability have made it possible to reach practically any public water supply in the State, install a plant, and treat the water within a period of 24 hours after notice has been received by the division in charge of this work. Since the original plant was designed, many improvements have been made which have greatly facilitated its portability, simplified its installation, and increased the accuracy of administering the chemical to the water. The plant here described consists of the usual features—i. e., one mixing and two storage barrels, a mixing apparatus, a solution-controlling device, and the necessary

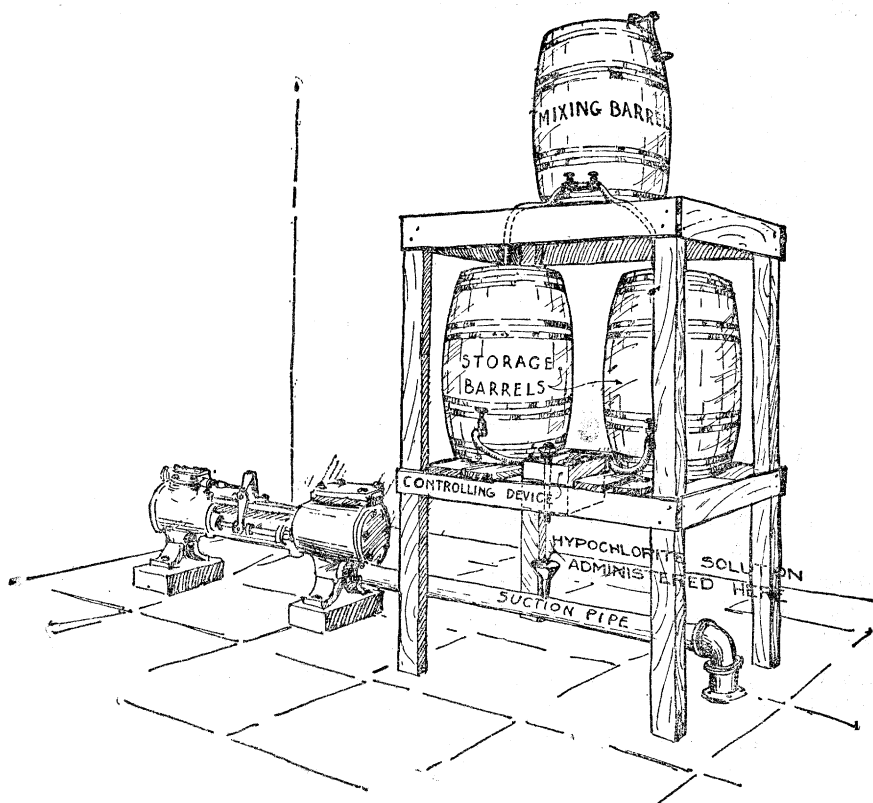


FIG. 1.—Sketch showing plant set up for operation.

valves and connections. The portability of this plant has been very much improved over the former type by its collapsible features, thus making it possible to pack all the necessary equipment for the plant, exclusive of the barrels and stand, in a small trunk which can either be carried by the investigator or shipped. The trunk holds, in addition to the plant, a 10-pound can of calcium hypochlorite or "bleach."

It was found impracticable and expensive to ship the necessary barrels and the portable stand to the locality, as these parts were easily obtainable where such a plant could be used, and an order for this material could be given to the local officials by telephone or telegraph

and it could thus be in readiness when the other equipment arrived.

A sketch of this plant installed and ready for use is shown in figure 1. This is a typical case so far as the arrangement of the plant is concerned, and it should be understood that installations must necessarily be made to fit the conditions found at the different localities.

Figures 2, 3, and 4 show a plan and detail drawings of the collapsible mixing device and the method of attaching the same to the barrel. The mixing device consists of a horizontal shaft connected by means of a bevel gear to a vertical shaft on which are attached the mixing paddles. The bearings of these shafts are bolted to a substantial wooden base, which in turn is clamped to the mixing barrel. The barrels usually employed for both mixing and storage purposes are the ordinary 50-gallon oak barrels used in commerce.

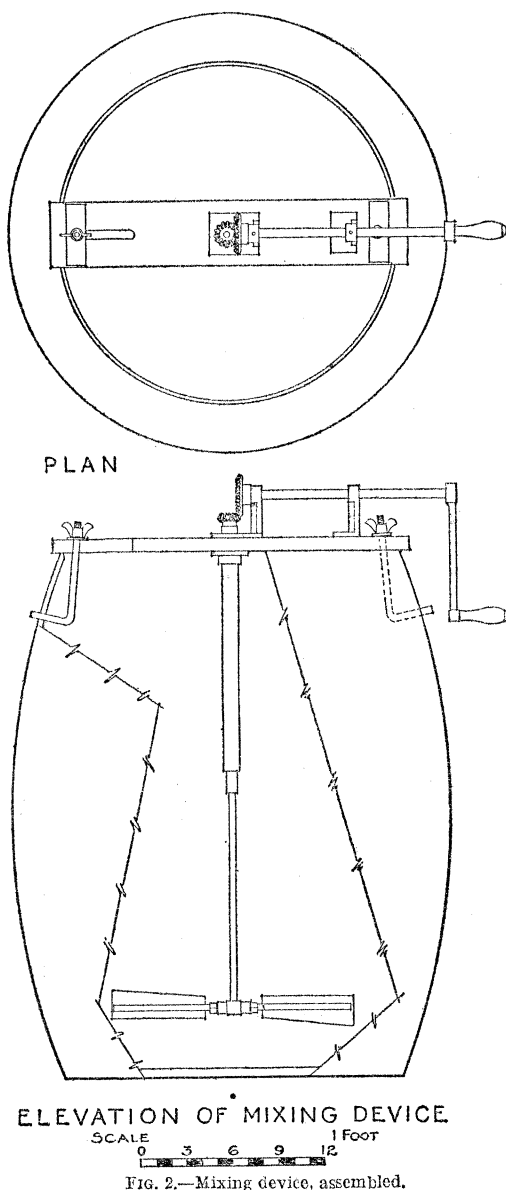


FIG. 2.—Mixing device, assembled.

Figure 5 shows a side and end elevation and plan drawing of the chemical feed box. The parts of this consist of a wooden box, a float valve, and a control valve. This drawing shows the arrangement of

these valves in the feed box. The float valve is used to maintain a constant level, while the control valve is used to administer definite amounts of solution to the water under treatment.

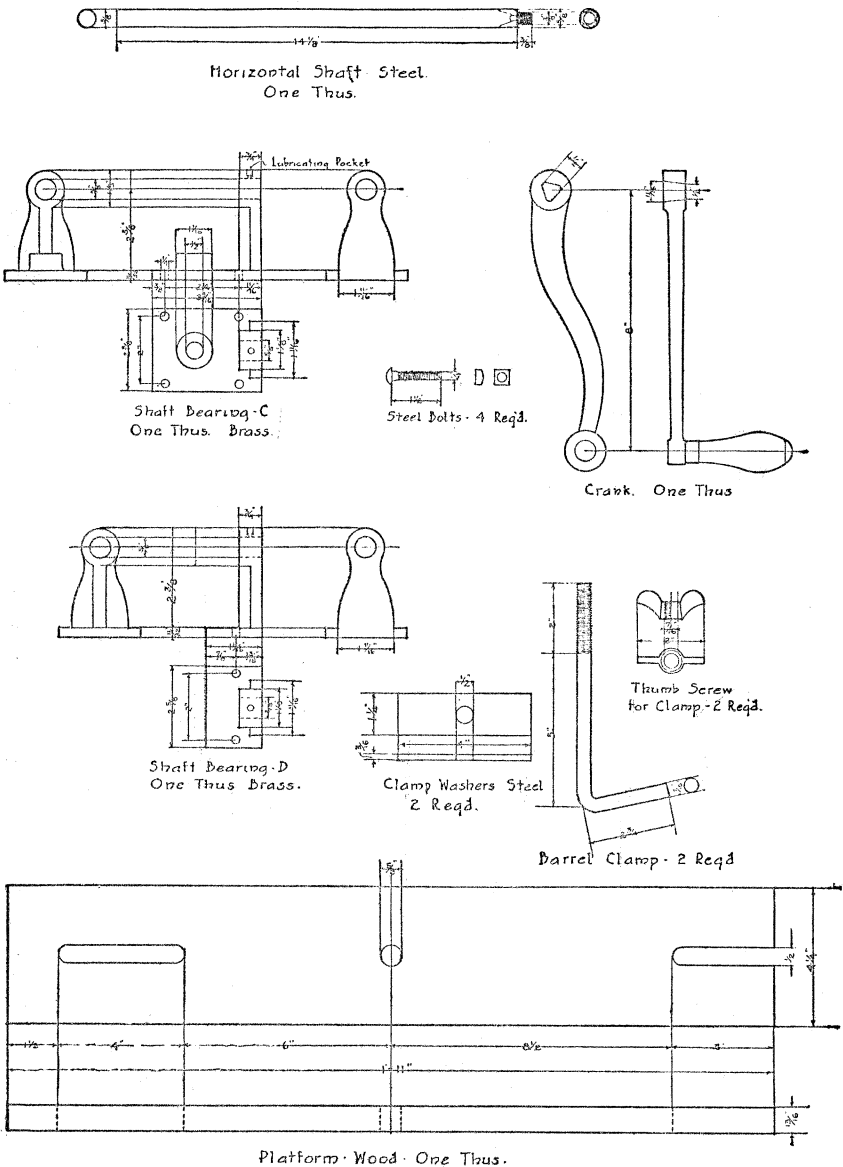


FIG. 3.—Mixing device details—Plate No. 1.

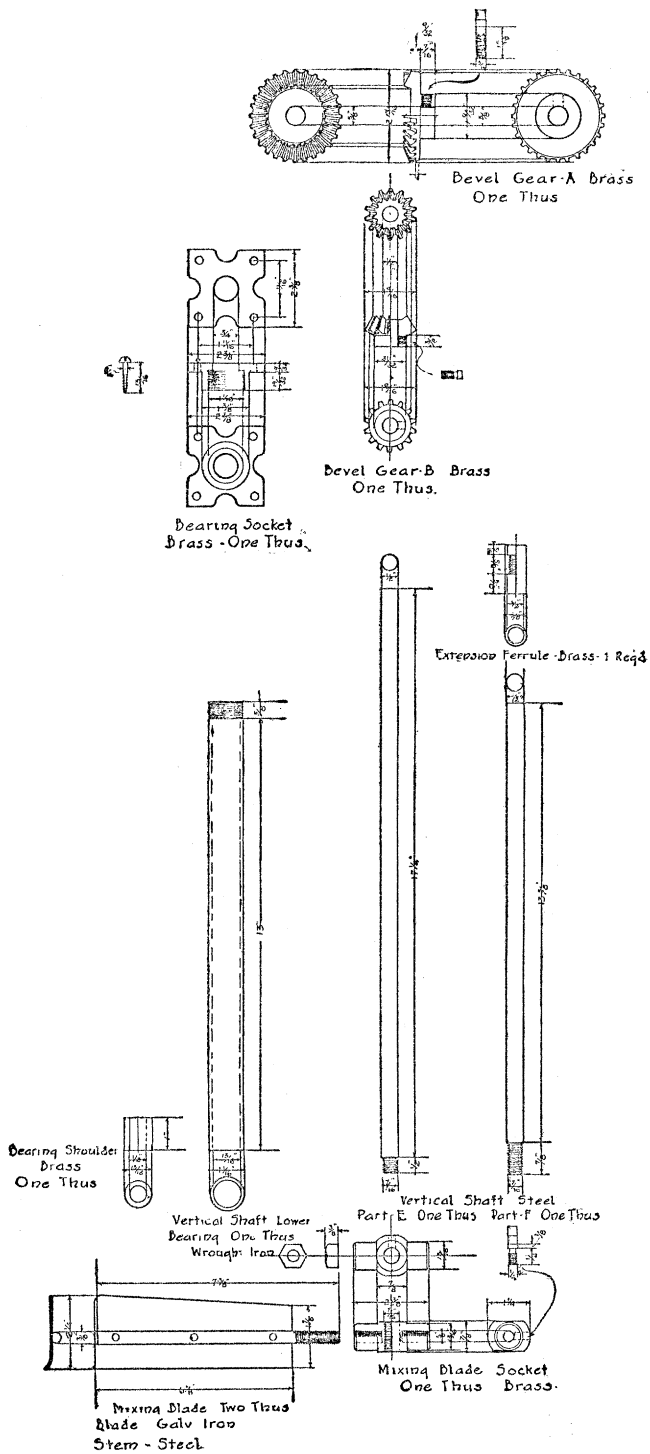
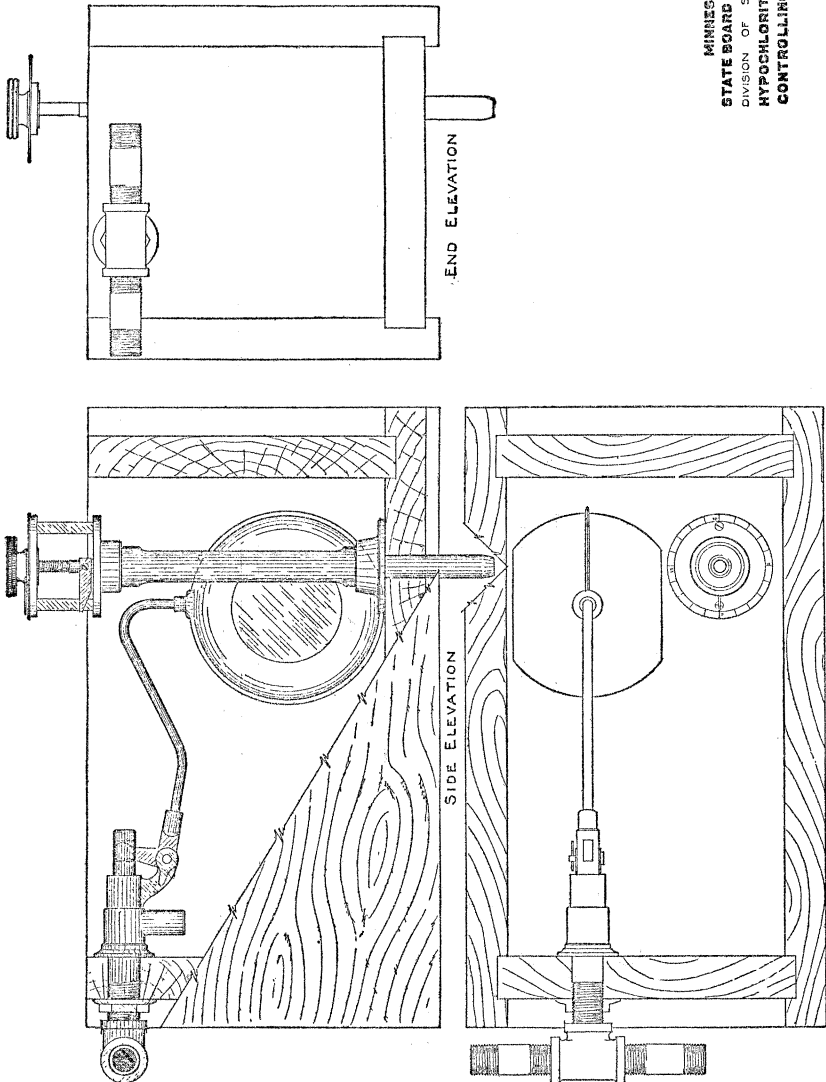


FIG. 4.—Mixing device details—Plate No. 2.

from the corrosive action of the chemical. It is so designed that it can be easily lined with standard hard-rubber tubing. The float here shown is of ordinary copper composition covered with an "acid-proof" paint. If these floats are kept well painted they will last for

MINNESOTA  
STATE BOARD OF HEALTH  
DIVISION OF SANITATION  
HYPOCHLORITE PLANT  
CONTROLLING DEVICE



PLAN  
Fig. 5.—Chemical feed box with float valve and control valve in place.

a long time and they are satisfactory for temporary installations. For permanent installations a hard-rubber or glass float is to be preferred. The wooden feed box is also covered with the same "acid-proof" paint.

Figures 7 and 8 show detailed drawings of the control valve. This valve consists primarily of two hard-rubber tubes which telescope. The inner tube has a narrow slot, which when uncovered permits the solution to flow from the box into the tube and discharge from its lower end. This telescoping arrangement is controlled by a thumb screw supported above the outer casing of the valve. There are two

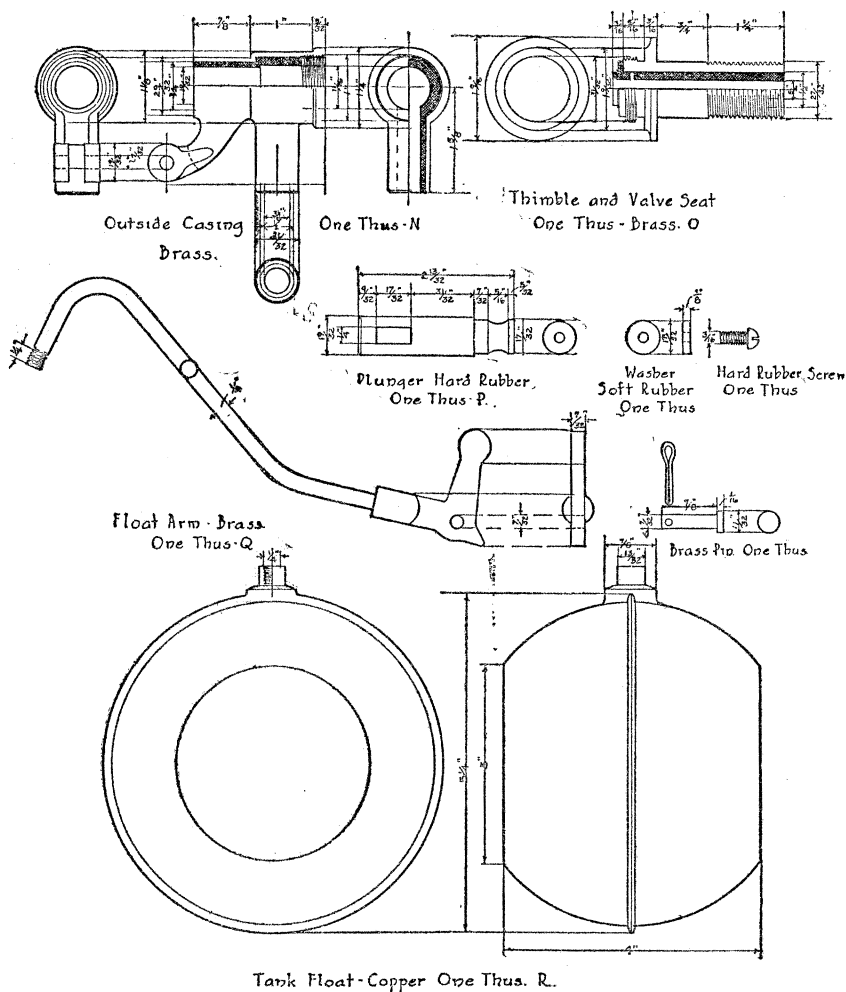


FIG. 6.—Float valve details.

indicators for setting the valve to discharge varying amounts of solution. The coarse adjustment indicates by means of a pointer on one side of the supports to the thumb screw, while the more accurate adjustment indicates on the circular dial at the top. The slot in the inner tube is kept clean by means of a hard-rubber pin which is screwed into the outer tube and passes through and moves in the slot



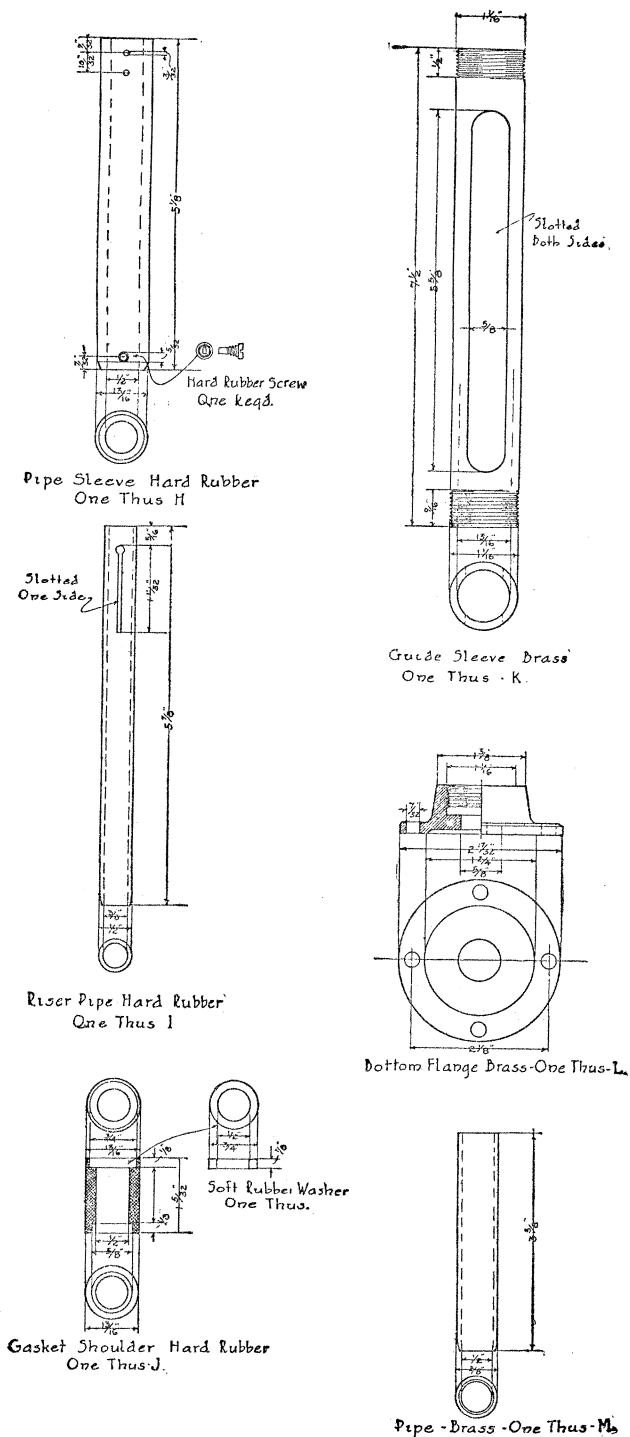


FIG. 8.—Control valve details—Plate No. 2.



FIG. 9.—TRUNK USED TO TRANSPORT PLANT PACKED FOR SHIPMENT.

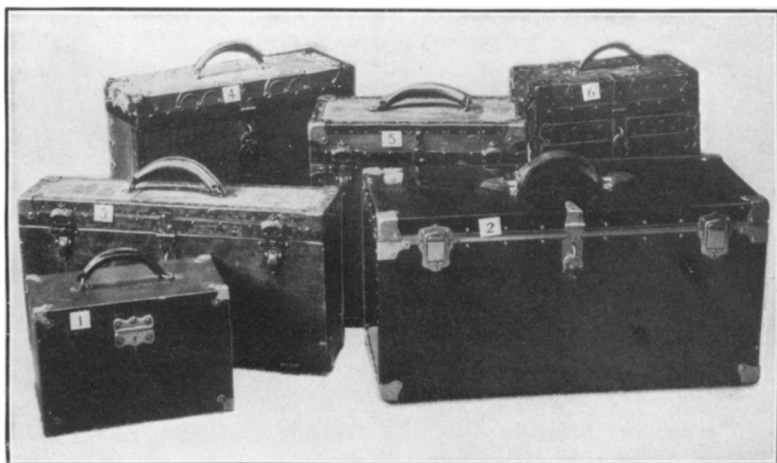


FIG. 10.—COMPLETE FIELD EQUIPMENT FOR ADMINISTERING AND TESTING THE HYPOCHLORITE TREATMENT OF A WATER SUPPLY, PACKED AND READY FOR SHIPMENT.

in the inner tube. This control valve has several desirable features; it is self-contained and can be easily and quickly set up in the field. The orifice part of the valve is constructed of material which is not destroyed by the chemical, and it is provided with a device which insures proper cleaning of the orifice. The float valve and control valve were originally designed for emergency plants, but they have been used with success for permanent installation.

The trunk shown in figure 9 and figure 10, No. 2, in which the plant is shipped, is constructed of three-ply wood covered with vulcanized fiber. The corners and cover are protected with brass fittings. The cover is provided with three ordinary brass hinges, with two bolts at the front to hold the cover in place, as well as a hasp for locking the trunk with a padlock. A strong leather handle is located in the center of the top of the cover. The trunk is 25 inches long, 10 inches wide, and  $12\frac{1}{2}$  inches deep, inside measurements. The interior is divided into two compartments, one 17 inches in length and the other  $7\frac{3}{4}$  inches in length. The partition separating these two compartments is constructed of  $\frac{3}{4}$ -inch wood material.

Figure 9 shows the trunk packed for shipment. It contains the following material: One chemical feed box, one float valve, one control valve, one collapsible mixing device, four  $\frac{1}{2}$ -inch brass gate valves, eleven  $\frac{1}{2}$  by 3 inch iron nipples, two  $\frac{1}{2}$ -inch iron tees, 12 feet of  $\frac{3}{4}$ -inch rubber garden hose, and one 10-pound can of calcium hypochlorite, or "bleach." This constitutes the entire equipment necessary to set up the plant and put it into operation, exclusive of the barrels and stand. The weight of the trunk and contents complete is 67 pounds.

This plant will conveniently treat water supplies distributing amounts up to 1,000,000 gallons per day and with additional effort on the part of the operators can be made to treat quantities up to 4,000,000 gallons per day.

The portable equipment shown in figure 10 which accompanies this plant, No. 2, when it is shipped into the field for service is as follows: An outfit (*b*) for testing the chemical phases of the hypochlorite treatment, No. 3, weight 18 pounds; a small portable incubator (*b*), No. 5, weight 24 pounds; an outfit for carrying the necessary media for field work, No. 1, weight 7 pounds; and at least one of each of the regular routine sampling outfits for the collection of bacteriological samples (*c*), No. 4, weight 27 pounds; and chemical samples, No. 6, weight 19 pounds, of water in the field. The total weight of the entire equipment here mentioned is 162 pounds. The media case, No. 1, is usually carried into the field, as it is difficult to ship liquid media already tubed for use, thus reducing the total shipping weight of the remaining apparatus to 155 pounds.

For rapid bacteriological work on water supplies in the field, presumptive tests (*d*) are made. After these tests have failed to show

the presence of *B. coli* in 100 c. c. amounts in the treated water, final bacteriological samples are collected, plated, and prepared in the field, and shipped to the main laboratory, with the routine sampling outfit previously mentioned. These final bacteriological samples serve as a check on the presumptive tests which were made in the field. Whenever necessary, samples are collected for physical and chemical examination.

The plant and equipment described in this article make it possible for a trained worker to enter the field equipped to handle in an emergency the problems met with in treating a polluted water supply. The Minnesota State Board of Health keeps this equipment constantly on hand and in readiness for immediate shipment to any locality requiring such assistance. This work is in charge of the division of sanitation.

The writer wishes to acknowledge the valuable assistance of Mr. J. A. Childs and Mr. J. B. Hills in preparing the sketches and drawings of this article, and the excellent work of Mr. H. Rotschka on the mechanical parts of the portable plant.

#### References.

- (a) Engineering News, vol. 65, No. 14, 1911, p. 402.
- (b) American Journal of Public Health, vol. 2, No. 12, p. 948.
- (c) Public Health Reports, United States Public Health Service, vol. 29, No. 20, p. 1224.
- (d) American Journal of Public Health, vol. 2, No. 12, p. 954.

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### VENEREAL DISEASE.

#### ITS PROBABLE PREVALENCE—AN ATTEMPT TO REACH A DEFINITE BASIS OF STATISTICAL VALUE.

By CHARLES E. BANKS, Senior Surgeon, United States Public Health Service.

It must be conceded that the efforts of students of social conditions to estimate the prevalence of venereal disease in any community, State, or nation have been inherently imperfect in results by reason of the absence of any authentic records of definite value. The best that can be said of the estimates is that they are the personal guesses of the men engaged exclusively in venereal work, balancing their impressions into concrete statements of percentages, or that they have been based on the statistics of some municipal dispensary of a large city with its thousands of clients annually by checking off the ratio of venereal cases. Those guesses vary all the way from the extravagant opinion that 80 per cent of the adult male population has been infected, to the more modest suggestion that 20 per cent would cover it.

As there is no present method of getting satisfactory reports of the occurrence of cases of venereal diseases, and as practically every case is concealed by the patient and his physician, if he employs one,